

PERICLIMENES FRANKLINI SP. NOV., A NEW DEEP-SEA SHRIMP
FROM THE CORAL SEA
(CRUSTACEA:DECAPODA:PALAEMONIDAE).

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ABSTRACT

A new species of pontonine shrimp, *Periclimenes franklini*, from 300 m in the Coral Sea, is described and illustrated. The new species occupies an isolated systematic position in the genus *Periclimenes* as the carapace lacks an antennal spine, and is closely related only to *P. gorgonicola* Bruce, from which it differs in the presence of large articulated postrostral spines. Both species suggest that the genus *Mesopontonia* Bruce, is more closely related to the genus *Periclimenes*, rather than other genera that lack an exopod in the third maxilliped. *Periclimenes franklini* is probably also a gorgonian associate.

KEYWORDS: Crustacea, Decapoda, Palaemonidae, *Periclimenes*, new species, deep-sea, Coral Sea.

INTRODUCTION

Although Australian seas are provided with a high diversity of pontonine shrimps, particularly of the genus *Periclimenes*, very few species have been reported from deeper waters, over 100 m. *Periclimenes alcocki* Kemp, 1922, has been reported from off Bateman's Bay, New South Wales, at 330 m (Bruce 1983). *P. hertwigi* Balss, 1913, on *Araeosoma thetidis*, off Mooloolaba, Queensland, at 500 m (Bruce 1983), and *Mesopontonia gorgoniophila* Bruce, 1967, from 26° 27'S. 153° 51'E., at 270 m (Bruce 1983). The addition of a single new deep-water species is therefore of interest. Recent studies, with suitable small mesh gear, in New Caledonian waters (Bruce 1990) have indicated that a moderately rich pontonine fauna is present in deep water in other regions of the Coral Sea and it is likely that suitable studies would provide an equally rich fauna from Australian waters.

Carapace length refers to the postorbital carapace length. Abbreviations used in the text: NTM, Northern Territory Museum, Darwin; QM, Queensland Museum, Northern Branch, Townsville.

SYSTEMATICS

Periclimenes franklini sp. nov.
(Figs 1-5)

Type material. 1 male, 2 females (1 ovig.) - CIDARIS 1, R.V. *Franklin*, Stn. 42-2, 17°

21.7'S. 146° 48.52'E. 296-302m depth, modified Ockelman-Pichon sledge, 15 May 1986, (ref. NW 145). The ovigerous female (W.13234) is designated as the holotype and the single male (W.13235) as allotype, and both are deposited in the collections of the QM. The non-ovigerous female paratype is dissected and deposited in the NTM (Cr. 006789).

Description. A medium sized shrimp, of slender, subcylindrical body form.

Carapace smooth, glabrous, with rostrum well developed, about 0.85 of carapace length in female, 0.97 in male, distinctly exceeding antennular peduncle, reaching to about level of tip of scaphocerite lateral tooth. compressed, very feebly up-curved, slender, acute; dorsal carina well developed, with seven long, acute, slender teeth, of decreasing size anteriorly, anterior to the posterior orbital margin, anteriormost tooth small, sub-apical in female, larger, post-apical in male; lateral carinae distinct, narrow, not posteriorly expanded; ventral carina well developed, with three acute teeth in female, four in male; supraorbital spines lacking, postorbital rostral carina well developed, with two large articulated spines, at about 0.70 and 0.90 of carapace length; orbital notch distinct, inferior orbital angle feebly produced, subacute, with reflected lower inner flange, antennal spine absent, hepatic spine large, slender, acute, laterally projecting, not reaching anterior margin of carapace,

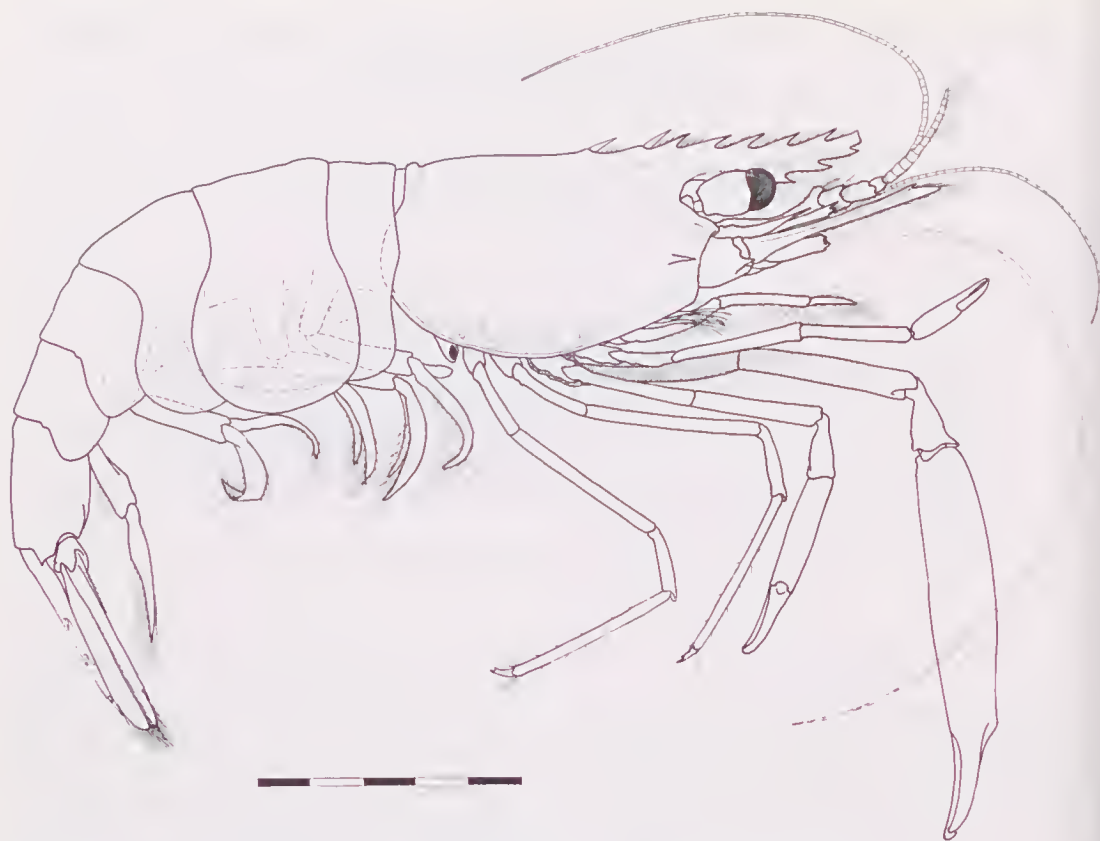


Fig. 1. *Periclimenes franklini* sp. nov., holotype female, Coral Sea. Scale bar in millimetres.

anterolateral branchiostegite not produced, bluntly angular.

Abdomen smooth, glabrous, third segment not posterodorsally produced, fifth segment about 0.66 of sixth segment length, sixth segment compressed, 1.5 times longer than central depth, posterolateral angle strongly produced, acute, posteroventral angle smaller, less acute, first three pleura bluntly rounded, enlarged in females, fourth and fifth feebly produced, posteriorly rounded. Telson slender, about 1.4 times sixth segment length, 4.0 times longer than anterior width, lateral margins straight, posteriorly convergent, slightly contracted proximally, with two pairs of large, subequal dorsolateral dorsal spines, about 0.65 of dorsal length, at about 0.45 and 0.7 of telson length, posterior margin subangular, with small median point, about 0.4 of anterior width, with three pairs of posterior spines, lateral spines shorter than dorsal spines, intermediate spines long, slender, about 9.0 times longer than basal width, 0.2 of telson length, submedian spines slender, setulose, 0.5 of intermediate spine length.

Eye well developed, with large, globular, well pigmented, slightly oblique cornea, with distinct small dorsal accessory pigment spot; stalk about as long as wide, slightly compressed.

Antennule with peduncle distinctly shorter than seaphocerite; proximal segment almost 2.0 times longer than proximal width, feebly tapering distally, with strong, acute, ventromedial tooth, distolateral margin produced, with rounded medial lobe, long slender lateral tooth, reaching to about 0.6 of intermediate segment length, stylocerite long, slender, reaching to about 0.8 of proximal segment length; statoecyst normal, with granular statolith; intermediate segment short, about 0.25 of proximal segment length, slightly narrower than dorsal length, with small setose lateral lobe, obliquely articulated with distal segment; distal segment about 1.1 times intermediate segment length, 1.7 times longer than wide; upper flagellum biramous, with proximal four segments of rami fused, shorter free ramus about 2.0 times fused portion length, with eight segments, about 13 groups of aes-

thetascus, longer ramus slender, filiform, about 1.75 times carapace length; lower flagellum slender, filiform, about 1.1 times carapace length, about 0.6 of longer upper ramus length, with about 30 segments.

Antenna with stout basicerite, with strong, acute lateral tooth; ischiocerite, macrocerite normal; carpocerite short, stout, about 2.8 times longer than central width, slightly compressed, reaching to about distal margin of proximal segment of antennular peduncle, flagellum well developed, about 2.5 times carapace length; scaphocerite large, distinctly exceeding rostrum, about 3.3 times longer than broad, greatest width at about 0.3 of length, feebly tapered distally, distal end broadly, bluntly angular, far exceeding tip of stout distolateral tooth.

Ophthalmic somite without bec ocellaire; epistome unarmed; first three thoracic sternites moderately broad, unarmed; fourth with feebly bilobed transverse plate, without slender median process; fifth narrow, sixth to eighth broadening posteriorly, unarmed.

Mandible (right) with corpus normal, without palp; molar process robust, obliquely truncate distally, with six blunt marginal teeth, with small tuft of setae distoventrally; incisor process well developed, tapering distally, distal margin oblique, with three acute teeth, central tooth smaller, disto-medial margin with six minute denticles. Maxillula with bilobed palp, lower lobe slightly larger than upper, with small hooked seta ventrally; upper lacinia broad, with about 10 short, stout, simple spines distally; lower lacinia short, tapering, blunt, with numerous simple, spiniform setae. Maxilla with short stout, tapering palp, with few short plumose setae proximolaterally; basal endite deeply bilobed, lobes subequal, elongate, with about 11 slender, simple setae distally, proximal medial margin with single slender, simple seta; coxal endite obsolete, medial margin convex, glabrous; scaphognathite well developed, about 2.75 times longer than broad, posterior lobe about 1.4 times longer than broad, anterior lobe about 1.4 times longer than wide, medial margin concave. First maxilliped with elongate, subcylindrical, tapering, pointed, non-setose palp, exceeding distal margin of basis; basal endite large, broadly rounded, distal and medial margins with numerous slender, feebly setulose setae; coxal endite small, separated

from basal endite by small medial notch, sparsely setose; exopod well developed with large caridean lobe, flagellum slender, with five plumose distal setae; epipod large, triangular, feebly bilobed. Second maxilliped with normal endopod; dactylar segment about 3.25 times longer than wide, medial border with numerous short, stout, densely serrate spines and larger, slender serrulate setae; propodal segment broad, distomedially expanded, margin with six stout, feebly serrulate spines; carpus with distomedial angle acutely produced; ischiomerus without special features; basis elongate, feebly excavate medially; exopod well developed, flagellum with five plumose distal setae; coxa with small medial process, with simple setae; epipod subrectangular, without podobranch. Third maxilliped with endopod exceeding carpocerite by about 0.5 of distal segment; ischiomerus almost fully fused to basis, compressed, bowed and twisted, about 6.5 times longer than proximal width, expanded distomedially, distolateral margin feebly setose, with two small spines distally, ventrolateral margin with long finely setulose, spiniform setae, medial margin more densely setose, with numerous long spiniform setae, particularly distally, with 12 short, plumose, submarginal setae along proximal 0.5 of ventral border; penultimate segment subcylindrical, about 5.0 times longer than wide, feebly tapering distally, with groups of paired long, feebly setulose, spiniform setae medially, six long, spiniform setae laterally; distal segment about 0.5 of ischiomerus length, about 3.3 times longer than proximal width, tapering distally, lateral margin with 7-8 long spiniform setae, medial margin with about 10 groups of serrulate spines and longer spiniform setae; basis feebly angular medially, with few simple setae; exopod with slender flagellum, with five plumose distal setae; coxa feebly produced medially, with large suboval, distally angulate, lateral plate; with small quadrilamellar arthrobranch.

First pereopod exceeds carpocerite by chela and half carpus, and scaphocerite by finger of chela; chela with palm subcylindrical, feebly compressed, about 2.7 times longer than deep, with six transverse rows of short serrulate setae proximolaterally; dactyl about 0.75 of palm length, 4.0 times longer than proximal depth, tapering distally to strongly hooked tip, with sharp, entire edge over distal 0.75 of



Fig. 2. *Periclimenes franklini* sp. nov., paratype female. A, carapace, eye, antennal peduncles. B, anterior carapace, eye, antennal peduncles, dorsal view. C, anterior carapace and rostrum. D, antennule. E, antenna. F, eye. G, telson. H, same, posterior spines; inset, dorsal spine. I, uropod. J, same, distolateral exopod.

cutting edge; fixed finger similar, about 4.5 times longer than proximal depth; carpus about 1.1 times length of chela, 5.0 times

longer than distal width, tapered proximally, with numerous serrulate setae along distomedial margin; merus slender, subcylindrical,

about 1.1 times carpus length, about 8.5 times longer than wide; ischium about 0.6 of merus length, about 3.75 times longer than greatest

depth, narrowed proximally, distoventrally feebly carinate, setose; basis about 0.5 of merus length, 2.5 times longer than deep, dis-

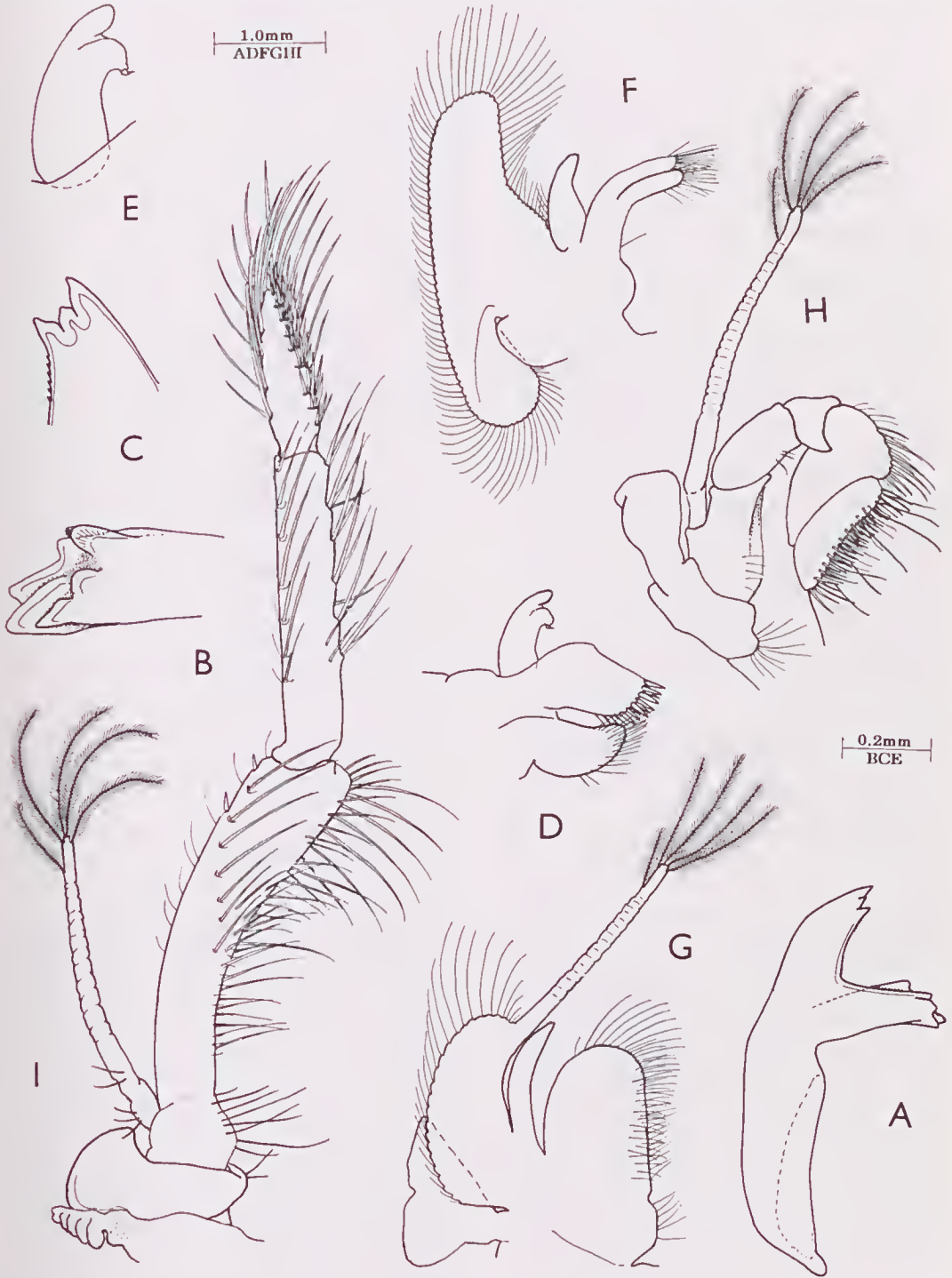


Fig. 3. *Periclimenes franklini* sp. nov., paratype female. A, mandible. B, same, molar process. C, same, incisor process. D, maxillula. E, same, palp. F, maxilla. G, first maxilliped. H, second maxilliped. I, third maxilliped.

toventrally feebly earinate, with small distoventral process, feebly setose; coxa robust, with small, setose, distoventral process.

Second pereopods well developed, markedly unequal; major chela (female) with merus reaching to about distal end of antennular peduncle, distal scaphocerite exceeded by 0.5 of carpal length, chela about 1.5 times earpace length, with palm very minutely tuberculate, subcylindrical, slightly swollen proximally, feebly compressed, about 4.0 times longer than deep; dactyl about 0.45 of palm length, about 4.0 times longer than proximal depth, with strongly hooked, acute tip, without lateral flange, cutting edge distally with feeble cutting edge, proximally with two large, robust, acute teeth, distal slightly larger than proximal, separated by U-shaped notch, with thick rimmed fossa proximally; fixed finger similar, with low acute tooth opposing U-shaped notch on dactyl, with low tricuspid tooth proximally; carpus about 0.3 of palm length, 1.5 times longer than distal width, distally expanded, unarmed; merus about 0.86 of palm length, 5.0 times longer than distal width, feebly tapered proximally, unarmed, without distoventral tooth; ischium subequal to merus length, more slender, about 6.5 times longer than distal width, feebly tapering proximally; basis and coxa normal, without special features. Minor second pereopod (female) about 0.73 of earpace length, chela about 0.5 of major chela length, reaching to about 0.33 of the major chela palm length, exceeding scaphocerite by distal half of carpus; chela with palm smooth, about 3.75 times longer than deep, slightly swollen proximally; fingers about 0.6 of palm length, slender, with strongly hooked tips, distal half with sharp cutting edge, proximal half with pair of low, subacute teeth, slightly smaller on fixed finger; carpus about 0.5 of palm length, 2.5 times longer than distal width, distally feebly excavate, unarmed; merus 2.0 times carpus length, 0.9 of palm length, 6.5 times longer than distal width, unarmed; ischium subequal to meral length, about 6.6 times longer than distal width, unarmed; basis and coxa normal, slender. Male specimen lacking major second pereopod, minor pereopod as in female; chela about 1.09 times earpace length.

Ambulatory pereopods slender; third exceeding scaphocerite by dactyl and distal fourth of propod, dactyl with corpus com-

pressed, about 2.4 times longer than proximal width, feebly tapering distally, ventral margin concave, with pair of distolateral setae, unguis feebly demarcated, acute, about 0.5 of dorsal length of corpus, 4.0 times longer than proximal width, slightly curved; distoventral accessory tooth stout, 0.5 of unguis length, 1.8 times longer than proximal width, gaping widely from unguis; propod about 6.4 times longer than dactyl, about 0.65 of earpace length, 12.0 times longer than deep, with long terminal and preterminal pairs of ventral spines, four single ventral spines, of decreasing size proximally, with numerous long simple setae, distally and along dorsal margin; carpus 0.4 of propod length, with distodorsal lobe, unarmed; merus about 0.95 of propod length, 11.0 times longer than wide, unarmed; ischium about 0.5 of merus length, 4.7 times longer than distal width, tapering proximally, unarmed; basis and coxa normal. Fourth pereopod similar to third, propod subequal to third propod length. Fifth pereopod similar to third, propod longer and more slender, about 1.1 of third propod length, 14.0 times longer than proximal width, with single distoventral spine, with two transverse distolateral rows of simple setae, ventral margin with one pair of spines, with five isolated ventral spines, distinctly smaller than third propod spines.

Male first pleopod with basipodite 2.0 times longer than broad, exopod about 1.2 times basipodite length, 5.0 times longer than central width; endopod about 0.5 of exopod length, about 3.0 times longer than wide, slightly expanded centrally, with small distomedial lobe, distolateral margin with 11 short feebly plumose setae, proximal third of medial margin with three long plumose setae proximally, four very short simple curved spines distally. Male second pleopod with basipodite about 2.1 times longer than broad, 1.2 times first pleopod basipodite length, exopod about 4.6 times longer than broad, 1.2 times basipodite length, endopod 0.93 of exopod length, 6.0 times longer than broad, with appendices at 0.27 of medial margin length; appendix masculina with corpus subcylindrical, tapered proximally, about 6.5 times longer than distal width, reaching to about 0.5 of endopod length, with three simple distal spines, two long, one short, dorsolateral margin with four simple spines, three long, proximal spine short; appendix interna slen-

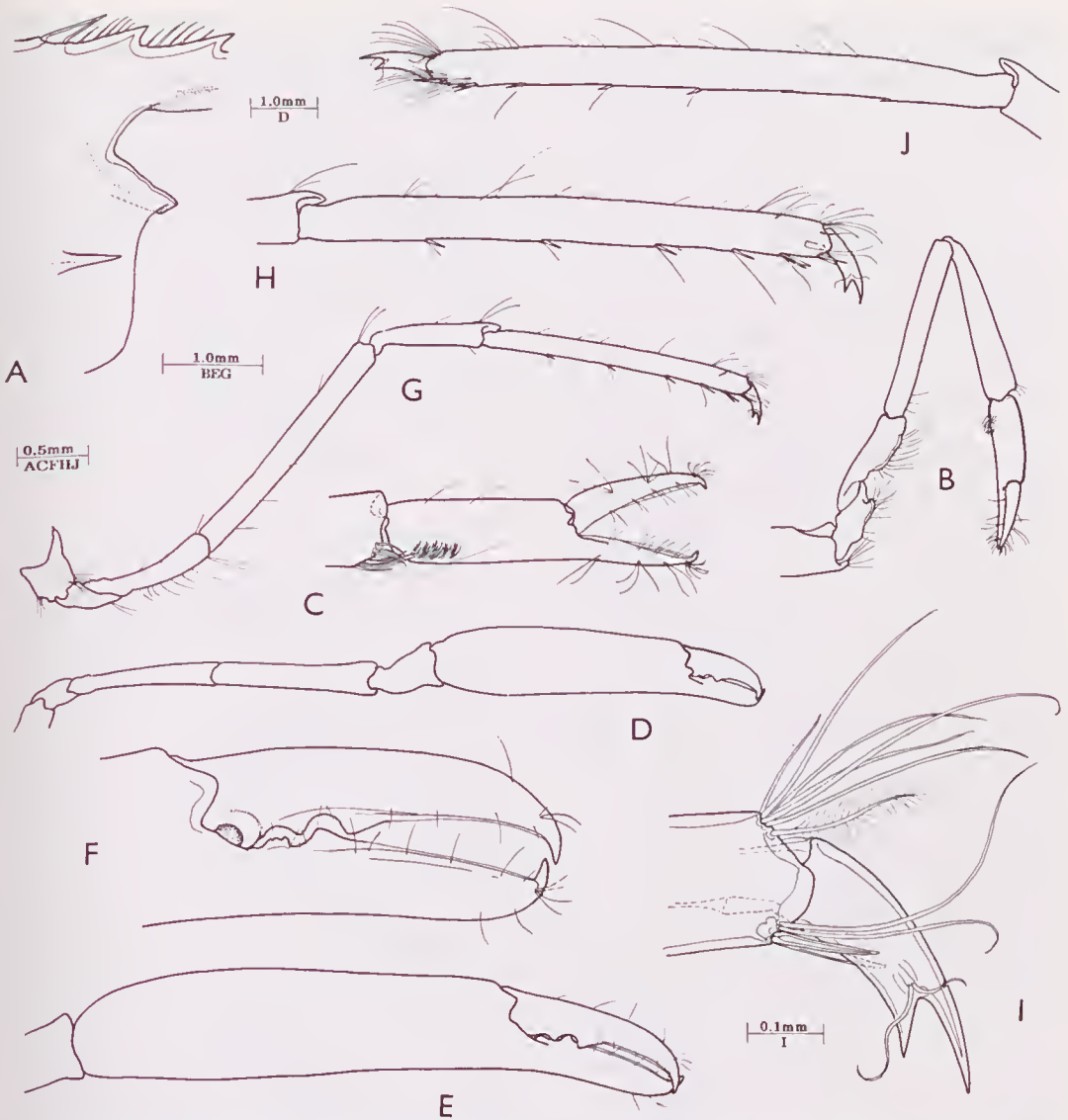


Fig. 4. *Periclimes franklini* sp. nov., paratype female. A, orbital region, lateral. B, first pereiopod. C, same, chela. D, major second pereiopod. E, same, chela. F, same, fingers. G, third pereiopod. H, same, propod and dactyl. I, same, dactyl. J, fifth pereiopod, propod and dactyl.

der, slightly swollen distally, with few cincinnuli, distinctly exceeding corpus of appendix masculina.

Uropod with protopodite short, with blunt posterolateral lobe; exopod broad, subequal to telson length, 3.0 times longer than wide, greatest width at 0.6 of length, lateral margin feebly convex with large, acute distolateral tooth, with longer, slender, mobile spine medially, distal lamella broad, separated by distinct diaeresis; endopod 0.92 of exopod length, 3.6 times longer than broad, greatest width at 0.3 of length.

Ova small, single ovigerous female with only three undeveloped ova.

Measurements (mm). Holotype female: carapace length, 5.25, carapace and rostrum, 8.84; total length (approx.) 22.0+; major chela, 8.6; minor chela, 3.75. Allotype male: carapace length, 4.0; carapace and rostrum, 8.0; total length (approx.), 19.5; minor chela, 4.35. Paratype female: carapace length, 4.6; carapace and rostrum, 8.4; total length (approx.), 21.0; major chela, 6.15. Length of ovum, 0.75.

Colouration and host. Unknown.

Systematic position. *Periclimenes franklini* is most closely related, amongst Indo-West Pacific species of *Periclimenes*, only to

P. gorgoncola Bruce, 1969, which is the only other species so far described lacking an antennal spine. These two species are closely similar in their general morphology, but *P.*

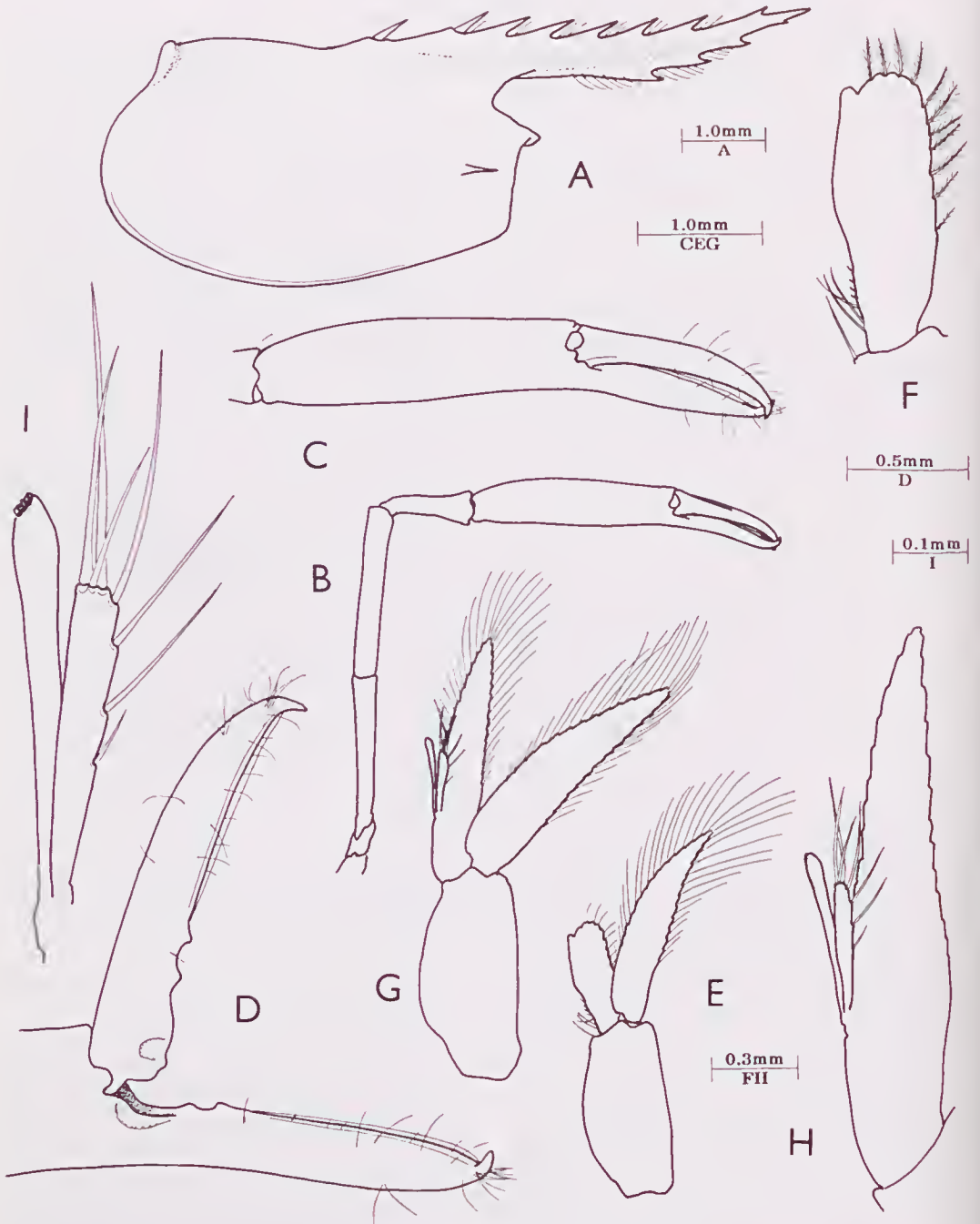


Fig. 5. *Periclimenes franklini* sp. nov., allotype male. A, carapace and rostrum. B, minor second pereiopod. C, same, chela. D, same, fingers. E, first pleopod. F, same, endopod. G, second pleopod. H, same, endopod. I, same, appendix masculina and appendix interna.

franklini may be readily distinguished from *P. gorgonicola* by the presence of the two large, articulated postrostral spines on the carapace, which are replaced by smaller, non-articulate teeth in the latter species, in which the stylocerite is also less elongate, reaching only to the middle of the length of the proximal segment of the antennular peduncle. In *P. gorgonicola*, the morphology of the inferior orbital angle is identical, and the fourth thoracic sternite also has a notched, transverse plate, exactly as in *P. franklini*.

Etymology. The specific epithet is given in recognition of the contribution of the CSIRO Research Vessel 'Franklin' to knowledge of Australia's benthic deep-sea fauna.

DISCUSSION

Periclimenes franklini, together with *P. gorgonicola*, appears to occupy an isolated position in the genus *Periclimenes*, although closely related to some of the other deep-water species. They do not appear to be closely related to *P. longicaudatus* (Stimpson, 1860) a Caribbean-west Atlantic species that also lacks an antennal spine. The systematic importance of the antennal spine appears to be considered less important than that of the hepatic spine, and supraorbital and epigastric spines may be present or absent in the genus *Periclimenes*. The loss of the hepatic spine would indicate a position in some other genus, such as *Philarius* Holthuis. Re-evaluation of the genus *Mesopontonia* Bruce, 1969, shows that it is closely related to species of *Periclimenes*, particularly *P. franklini* and *P. gorgonicola*. *Mesopontonia gorgonioplila* closely resembles *P. franklini* in its general morphology, particularly in the orbital region, and the postrostral carina also has two articulated spines instead of fixed teeth. Indeed, the genus *Mesopontonia* could readily have evolved from a *Periclimenes* species, such as *P. franklini* by the simple loss of the exopod of the third maxilliped. *Mesopontonia* appears much less closely related to the other genera that lack the third maxilliped exopod, such as *Pontonides* in the Indo-West Pacific, and numerous Atlantic-Mediterranean genera. *Periclimenes franklini* does show slight but significant reduction in the size of the exopod of the third maxilliped, when compared with those of some other deep-sea *Periclimenes* species. In *P. foresti* Bruce, 1981, for ex-

ample, the exopod reaches to the distal margin of the merus of the endopod, is broader, with numerous plumose setae distally. In both *P. foresti* and *P. foveolatus* Bruce, 1981, the antennal spine is small and marginal, in comparison with many other *Periclimenes* species, suggesting a process of obsolescence.

Periclimenes longicaudatus (Stimpson) appears to be a member of the *P. aesopius* species group, and records of its occurrence in the Indian Ocean should probably be referred to *P. holthuisi* Bruce, 1969, or related species. Its inferior orbital angle is more strongly produced and knob-like; the rostrum, which has the upper margin convex, with a dentition of 1 + 6-8/(0) 1-2; second pereopods with chelae subequal, similar, and ambulatory dactyls long and slender, so that it is readily distinguishable from both *P. franklini* and *P. gorgonicola*.

Periclimenes gorgonicola is a known associate of gorgonians of the genera *Melittea* and *Acabaria*. *Mesopontonia* has been found in association with the same genera, both in the northern South China Sea (Bruce 1979), which suggests that *P. franklini* may be involved with similar coelenterate associations.

A key for the identification of the deep-water Indo-West Pacific species of the genus *Periclimenes* has been provided by Bruce (1990). *Periclimenes franklini* can be readily included in this key by the insertion of the following modification. The addition of *P. franklini* raises to 21 the number of Indo-West Pacific *Periclimenes* species known to occur in depths of 100 m or more.

- 1. Antennal spine present 1a
- Antennal spine absent 1b
- 1a. First and second postrostral teeth acute and non-articulate; R. 2+ 8/4
 *P. gorgonicola* Bruce, 1969
- First and second postrostral teeth replaced by large, slender, articulated spines; R. 2 + 6-7/ 3-4*P. franklini* sp. nov.

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